

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3301

Roll No.

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B.Tech

(SEM I) ODD SEMESTER THEORY EXAMINATION 2009-10  
ELECTRONICS ENGINEERING

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.

## SECTION - A

1 Attempt all parts of this question. All parts of this  $2 \times 10 = 20$  question carry equal marks. This question contains TEN objective/Fill in the blank type/True False type questions :

- (i) When PN-junction is biased in the forward direction \_\_\_\_\_ in each region are injected into the other region.
- (ii) In a centre-tap full-wave rectifier,  $V_m$  is the peak voltage between the centre-tap and one end of the secondary. The PIV of the non-conducting diode is \_\_\_\_\_ when the filter is not connected.
- (iii) Which of the following statement is best suited for a Zener diode ?
  - (a) It is rectifier diode.
  - (b) It works in the forward bias region.
  - (c) It is a constant voltage device
  - (d) It is mostly used in clipping circuit.

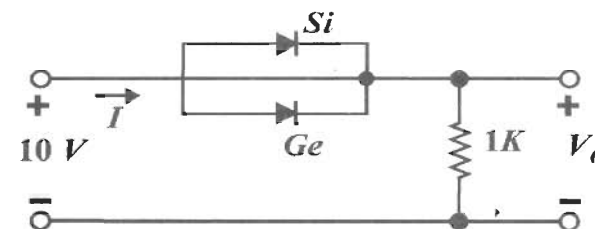


- (iv) An ordinary transistor is called 'bipolar junction transistor' because it has two poles: one positive and other negative. (True/False)
- (v) A common emitter transistor amplifier has a gain of 150. The output voltage is measured as 2V AC, the input voltage will be \_\_\_\_\_.
- (vi) The operation of a JFET involves :  
 (a) a flow of minority carriers.  
 (b) A flow of majority carriers.  
 (c) Recombination.  
 (d) Negative resistance.
- (vii) An ideal operational amplifier is used to make an inverting amplifier. There are two input terminals of the operational amplifier and are at the same potential because :  
 (a) the two inputs are directly short circuited internally.  
 (b) the input resistance of the operational amplifier is infinity.  
 (c) the open loop gain of the operational amplifier is infinity.  
 (d) all the above except option (a).
- (viii) The  $\alpha$  and  $\beta$  of a transistor are 0.99 and 99 respectively. If its  $I_{CBO}$  is 0.1 A, then its  $I_{CEO}$  will be \_\_\_\_\_.
- (ix) A basic meter can be converted in to an ohmmeter by connecting :  
 (a) a variable resistance in series.  
 (b) a battery in series.  
 (c) Both (a) and (b)  
 (d) None of the above .
- (x) (i)  $A + A'B =$   
 (ii)  $A.(A' + B) =$

## SECTION - B

2 Attempt any **three** parts of this question. All parts **10×3=30** of this question carry equal marks :

- (a) (i) Differentiate between static and dynamic resistance of a diode. **2**  
 (ii) Explain the two break down mechanisms of a reverse bias diode. **4**  
 (iii) Determine  $V_0$  and  $I$  for the following circuit. **4**



- (b) (i) Which of the transistor currents is always the largest ? Which one is the smallest ? Which two are relatively close in magnitude ? **5**  
 (ii) Draw the small signal equivalent circuit of a BJT and explain each component. **5**
- (c) Define the following : **10**  
 (1) Drain to source saturation current of JFET.  
 (2) Pinch off voltage of JFET.  
 (3) Voltage controlled resistance of JFET.  
 (4) Virtual ground in an op-amp.  
 (5) Voltage gain of a non-inverting amplifier.

- (d) (i) Prove the following identity : 5

$$(x_1 + x_2) \cdot (x'_1 \cdot x'_3 + x_3) \cdot (x'_2 x_1 \cdot x_3)' = x'_1 \cdot x_2$$

- (ii) Define : 5

- (1) Canonical form
- (2) Standard form
- (3) Sum of the products
- (4) Product of the sums
- (5) Don't care terms.

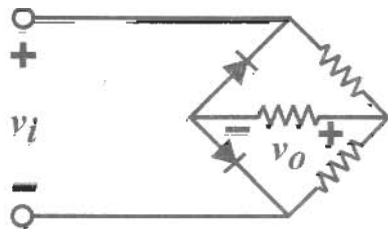
- (e) Explain, how do we measure the voltage, current 10  
and the phase of a wave form using the CRO ?

## SECTION - C

**Note :** Attempt all questions. 10×5=50  
All questions carry equal marks.

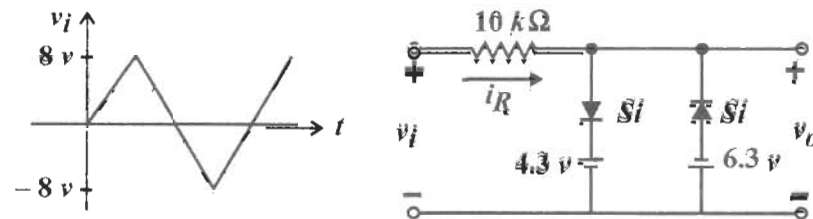
- 3 Attempt any two parts of the following :

- (a) Sketch  $v_o$  for the following circuit and determine the dc value of output voltage. Input to the circuit is 100 V peak to peak sine wave :

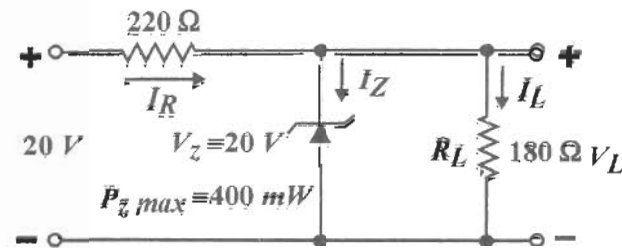


Diodes are ideal. All resistances are 2.2 kΩ

- (b) Sketch  $i_R$  and  $v_o$  for the following circuit :

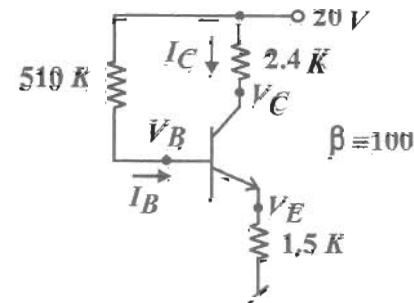


- (c) Determine  $V_L$ ,  $I_L$ ,  $I_Z$  and  $I_R$  for the following circuit.

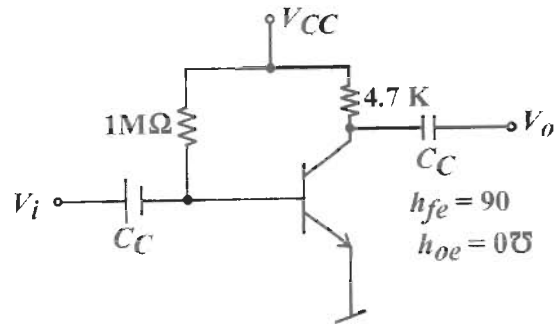


- 4 Attempt any one of the following :

- (a) Determine  $I_C$ ,  $V_E$ ,  $V_B$ ,  $V_C$  and  $I_B$  for the following circuit

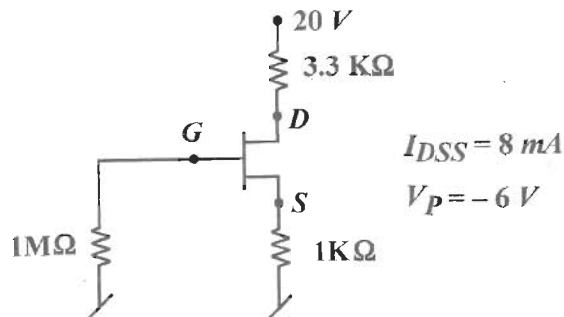


- (b) Determine  $V_{CC}$  for the following circuit if the voltage gain  $A_V = -200$ .

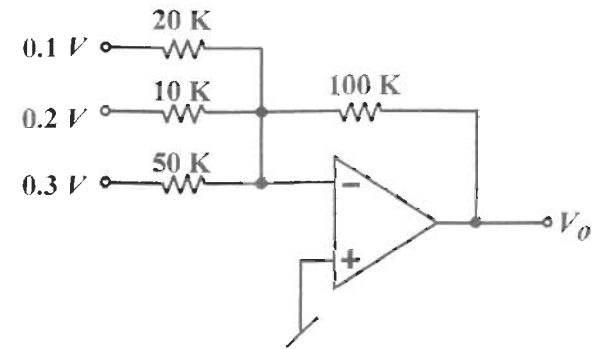


5 Attempt any **one** of the following :

- (a) Determine  $V_{GS}$ ,  $I_D$ ,  $V_{DS}$ ,  $V_D$ ,  $V_G$  and  $V_S$  for the following circuit :



- (b) (i) Enlist the characteristics of an ideal operational amplifier (op-amp). 3  
 (ii) Draw the circuit of a subtractor using op-amp and explain its working. 3  
 (iii) Determine the  $V_o$  for the following circuit : 4



6 Attempt any **two** of the following :

- (a) Convert the following numbers :

$$(2CCD)_{16} = (\quad)_8 = (\quad)_5$$

$$(7841)_9 = (\quad)_{10} = (\quad)_4 = (\quad)_2$$

- (b) Realize the following expression using Ex-OR/Ex-NOR gates and basic gates if required

$$f(A, B, C, D) = A'BC' + A'B'C + AC'D + ACD'$$

- (c) Minimize the given function using K-map and convert the minimized function into POS form

$$f(A, B, C, D) = \sum (1, 3, 5, 7, 9, 10, 12, 13)$$

7 Attempt any one part of the following :

- (a) Explain the working of digital voltmeter with help of a block diagram.  
 (b) Explain the working of CRO with the help of a block diagram.